Falls and Hospitalized Patients With Cancer: A Review of the Literature

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Preventing falls continues to be a serious issue faced by hospitals. Several studies have demonstrated an increased need for safety in hospitalized patients with cancer compared to other hospitalized populations. In addition, several fall-prevention studies in hospital settings have reported high rates of falls and injuries in this population. A cancer diagnosis is a significant risk factor for falling; however, few hospital studies have examined patients with cancer independently to determine why they are at greater risk for falls and injuries. Patients with cancer are a unique population because cancer treatments can cause side effects that may increase fall risk. Falls also can cause significant morbidity and mortality. More research is needed to better understand what specific oncology risk factors contribute to falls in the hospital setting.

Much research has been conducted in the hospital setting to reduce falls and prevent serious injury (Chu et al., 1999; Fischer et al., 2005; Hendrich, Nyhus, Kippenbrock, & Soja, 1995; Hitcho et al., 2004; Krauss et al., 2005, 2007; Lakatos et al., 2009; McCarter-Bayer, Bayer, & Hall, 2005; Morgan, Mathison, Rice, & Clemmer, 1985; O’Connell, Baker, Gaskin, & Hawkins, 2007; O’Connell, Cockayne, Wellman, & Baker, 2005; Pautex, Hermann, & Zulian, 2008; Rhode, Myers, & Vlahov, 1990; Stevenson, Mills, Welin, & Beal, 1998), as falls are commonly reported in hospitals (Institute for Healthcare Improvement, n.d.). Several studies have shown that having a cancer diagnosis may be linked to falls (Alcee, 2000; Chu et al. 1999; Fischer et al., 2005; Hendrich et al., 1995; Hitcho et al., 2004; Lakatos et al., 2009; O’Connell et al., 2005; Rhode et al., 1990; Stevenson et al., 1998), but few studies have investigated fall prevention solely in patients with cancer (Overcash, 2007; Pautex et al., 2008; Pearce & Ryan, 2008); of those three studies, only two were conducted in the inpatient setting. As a result, this article aims to report the current literature on falls in patients with cancer to assist healthcare professionals who work with this unique population.

A literature search was conducted using CINAHL®, PubMed, MEDLINE®, and PsycINFO databases. The key words that resulted in the most productive searches were fall prevention, hospital falls, falls and hospitals, and cancer and falls. Inclusion criteria used for the search were adult participants, inpatient hospital setting, English language, and any time frame and location. The review sought to determine what research exists to date that explores the phenomenon of hospitalized patients with cancer and fall prevention, and to determine what characteristics of those patients may place them at risk for falls. Identifying risk factors can be complex because patients with cancer may concurrently experience many common characteristics described in this article.

Ten studies met inclusion criteria (see Table 1).

### Patients With Cancer and Hospital Fall-Prevention Studies

Only two studies were found that reported exclusively about patients with cancer and falls in the hospital setting. Pearce and...
Ryan (2008) examined the relationship between falls and cancer diagnoses specifically. They found that patients with lung cancer (22%) fell more often than other groups of patients with cancer, followed by patients with head and neck cancer (17%) and hematologic cancers (15%). Pearce and Ryan (2008) suggested that metastatic disease (specifically in patients with lung cancer) should be considered a priority risk factor for falls because 64% of patients who fell had metastatic disease. A quantitative, exploratory study by Pautex et al., 2008 conducted over a one-year time period found that 36 patients with advanced cancer admitted to a palliative care ward experienced a fall at least once (N = 198). Of patients who fell, 22 had a history of falls prior to being admitted to the hospital. Patients who fell experienced delirium significantly more often and were prescribed more neuroleptics, corticosteroids, and opioids compared to patients who did not fall (Pautex et al., 2008).

Many hospital-based fall prevention studies exist that include oncology populations within their samples. Lakatos et al. (2009) found that patients with cancer experienced the third highest number of hospital falls (about 15 falls) compared to patients on the medicine (about 97 falls) and surgery services (about 54 falls). Of the 15 patients with cancer who fell, three experienced minor injuries and 12 were not injured. The study did not provide additional descriptions of the falls.

Fischer et al. (2005) sought to characterize 1,082 inpatients who had fallen to determine predictors of serious fall-related injuries by using quantitative, retrospective, and observational methods of research. Compared to patients in six other hospital services (women and infants, surgery, cardiology, neurology and orthopedics, medicine, and psychiatry), the oncology service had the highest percentage of falls resulting in injury (43%). The psychiatric service had the highest number of falls and the second highest injury rate (40%), and the medicine service had the second highest fall rate and the third highest number of falls resulting in injury (33%). In addition, Fischer et al. (2005) also found that the oncology unit had the third highest hospital fall rate (3.83 falls per 1,000 patient days) compared to other services. However, Fischer et al. (2005) did not report the specific details of which types of patients with cancer fell or the types of injuries sustained. In a quantitative, retrospective analysis of hospital falls and injuries by clinical departments, Rhode et al. (1990) found that the oncology department had 62 of 874 total falls over a one-year period.

Similar to Fischer et al. (2005), Hitcho et al. (2004) found that the oncology service had the third highest rate of 3.75 falls per 1,000 patient days compared to medicine and neurology, which each had 6.12 falls per 1,000 patient days. Hitcho et al. (2004) also reported that patients with cancer had the highest rate of injury, with 74% of first falls resulting in injury and 11% resulting in moderate or severe injury. This quantitative, prospective, descriptive study included characteristics of patients who fell (e.g., age, gender, mental status, elimination-related falls), circumstances of falls, and fall-related injuries, but did not provide detailed descriptions of patients with cancer specifically. However, Hitcho et al. (2004) did report that patients with cancer had the highest average length of stay when compared to other hospital services.

Alceo (2000) reported oncology fall data in a quantitative, retrospective review that aimed to quantify patients’ number of falls and identify factors that contributed to the falls in a community hospital. The greatest number of falls occurred on the oncology/medical unit (26% of 209 falls over an eight-month period). The study provided a description of the falls in general but did not provide oncology-specific fall details.

Stevenson et al. (1998) reported in their retrospective study on fall risk factors in the acute setting that 8% of patients who fell had a diagnosis of cancer compared to 23% of patients with cardiac diagnoses. In addition, cancer was not among the top 15 diagnoses of patients in the study. Additional descriptive data about falls in patients with cancer specifically were not included.

A prospective study by O’Connell et al. (2005) collected data before and after falls to examine risk factors and the nature of falls in a hospital oncology and palliative care setting. The study compared 34 patients who fell to 193 patients who did not fall. Patients who fell had a significantly higher mean age and were less alert, more confused, more likely to respond incorrectly to questions of orientation (e.g., person, time, place), more fatigued (self-rated fatigue level), physically more dependent based on the Eastern Cooperative Oncology Group performance scale, and weaker in arm strength before falling. O’Connell et al. (2005) did not report what types of diagnoses were included in either the oncology or palliative care setting or what percentage of the palliative care population had cancer.

Chu et al. (1999) investigated falls in 51 hospitalized older adult patients over a 17-month period. Twenty-two percent of patients who fell had cancer, which the authors found to be a significant clinical factor for falls. Chu et al. (1999) reported no additional oncology data about those findings.

Three additional studies showed evidence of work in this area. O’Connell et al. (2007) tested items on a fall risk assessment tool that included patient falls in oncology and medical settings. Holley (2002) described some general intrinsic and extrinsic factors related to falls and patients with cancer. Hendrich et al. (1995) developed a fall risk model and identified areas for nursing interventions and fall programs based on intrinsic risk factors associated with fall events, finding that a primary cancer diagnosis was a significant risk factor for falls. Therefore, a primary cancer diagnosis was added to the Hendrich Fall Risk Model.

None of the studies reported any descriptive information about the oncology inpatient population or information about why these patients experience falls. However, the studies clearly show that patients with cancer are at high risk for falls and injury. Therefore, information from the current evidence (e.g., potential risk factors) should be reviewed until more research is conducted.

Characteristics of Patients With Cancer That May Contribute to Fall Risk

People with cancer may have multiple risk factors for falls, including but not limited to age, gender, cognition, functional state, depression, polypharmacy, anemia, chemotherapy and biotherapy, endocrine (hormone) therapy, radiation treatment, surgery, and nutritional state. Those risk factors were included in this article because their individual potential to cause falls has been noted in the literature. The author found 11 studies.
Table 1. Research on Falls in Hospitalized Patients With Cancer From 1985–2009

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<th>STUDY</th>
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<td>Exclusively oncology</td>
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<td>Pautex et al., 2008</td>
<td>To determine the incidence rate of falls, the consequences related to falls, and other related factors in patients with cancer hospitalized in palliative care wards</td>
<td>Quantitative, exploratory 1-year period N = 198 patients 36 patients had fallen at least once. Sample included patients with cancer in the palliative care ward.</td>
<td>Incidence of falls was 6.9%. Delirium in patients who fell was significant. Patients who fell were taking more neuroleptics, corticosteroids, and opioids.</td>
<td>Strengths: large sample size; listed diagnosis-specific information; multiple variables collected. Weaknesses: Only patients with advanced cancer were included.</td>
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<td>Pearce &amp; Ryan, 2008</td>
<td>To explore the relationship between cancer as a disease process and patient falls</td>
<td>Quantitative, retrospective 13-month period N = 119 patients The study did not report whether the population was inpatient exclusively; however, incident reports were audited, suggesting that the sample was from an inpatient population.</td>
<td>Among patients who fell, 22% had lung cancer, 17% had head and neck cancers, 15% had hematologic cancers, and 64% had metastatic disease.</td>
<td>Strengths: large sample size; described falls by specific cancer diagnosis. Weaknesses: Limited information was provided on variables collected; the study did not report whether the population was inpatient versus outpatient.</td>
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| Not exclusively oncology and included various hospital services | | | | |
| Alcoe, 2000 | To quantify the number of patient falls and identify what factors caused those falls | Quantitative, retrospective 8-month period N = 209 total falls Community hospital | The greatest number of falls occurred on the medical/oncology unit at 26% (54 of 209 falls). | Strengths: large sample size. Weaknesses: Sample was not oncology specific; study did not provide details about falls in patients with cancer; medical patients and patients with cancer were grouped together. |
| Chu et al., 1999 | To investigate the clinical-and performance-oriented functional factors associated with falls in hospitalized older adult patients | Case controlled 17-month period N = 51 cases and controls | 11 of 51 patients (22%) who fell had an active neoplasm. | Strengths: Active neoplasm was found to be a significant risk factor for falls. Weaknesses: Study did not provide details about falls in patients with cancer. |
| Fischer et al., 2005 | To characterize inpatients who fall and to determine predictors of serious fall-related injury | Quantitative, retrospective, observational 18-month period N = 1,082 patients who fell Urban, academic hospital setting | The oncology service had the highest percentage of injurious falls (43%) and the third-highest hospital fall rate (3.83 falls per 1,000 patient days). | Strengths: large sample size. Weaknesses: Sample was not oncology specific; study did not describe details of falls in patients with cancer. |
| Hitcho et al., 2004 | To identify and analyze characteristics of patients who fall, the types and circumstances of their falls, factors contributing to patient falls, fall rates by service, and staffing patterns; to measure the extent of serious injury resulting from inpatient falls; to analyze risk factors for injury among patients who fall | Quantitative, prospective, descriptive 13-week period N = 183 falls 19 patients with cancer experienced falls; 2 of 19 sustained moderate or severe injury. | Patients with cancer had the highest rate of injury (74%) for first falls resulting in injury. They also had the highest rate of major injury, with 11% of first falls resulting in moderate or severe injury. | Strengths: Large sample size; study provided characteristics of all hospital falls from a variety of services. Weaknesses: Sample was not oncology specific; study reported that patients with cancer had high numbers of injuries but did not describe the injuries or provide details about the falls. |
| Lakatos et al., 2009 | To determine the prevalence of diagnosed and undiagnosed delirium in patients who fell during hospital stays | Retrospective 3-month period N = 252 patients | 6% of falls occurred on the oncology unit. 3 of 15 (20%) patients who fell had minor injuries; 12 were not injured. | Strengths: large sample size. Weaknesses: Study did not describe details about patients with cancer who fell or injuries sustained. |

ECOG—Eastern Cooperative Oncology Group; ICD—International Classification of Diseases; TCS—total confusion score

(Continued on next page)
that discussed patients with cancer and falls in the hospital setting; however, most of the studies did not report specific details about patients who fell. Limited information has been reported across studies.

Age

The aging process may place older people at risk for falls because of various progressive changes over the course of one’s lifetime (O’Connell et al., 2005; Rawsky & Digby, 2000). The process may include intrinsic factors such as changes in vision and gait and balance (Rawsky & Digby, 2000). In 2006, falls caused 18,242 deaths in people aged 55 years and older (Centers for Disease Control and Prevention, 2009). In 2008, people aged 55 years and older represented 23.4% of the U.S. population (U.S. Census Bureau, 2009). The majority of all cancers (about 77%) are diagnosed in people aged 55 years and older (American Cancer Society, 2010), and 60% of cancer survivors are aged 65 years or older (National Cancer Institute, 2010).

Only one study (O’Connell et al., 2005) specifically noted that age was found to be significantly associated with patient fall status. O’Connell et al. (2005) reported that patients who fell in an oncology and palliative care population had a higher mean age (74.79 years) compared to patients who did not fall (66.45 years). More oncology-specific studies are needed to determine how age plays a role in hospitalized patients with cancer and the prevention of falls.

Physiologic changes, as part of the normal aging process, also can alter one’s ability to tolerate cancer treatment, specifically chemotherapy (Balducci, 2005; Green & Hacker, 2004). Physiologic changes can place patients at risk for toxicities that affect older adults (Green & Hacker, 2004), thus potentially contributing to falls.

Gender

Gender may play a role in predicting falls. O’Connell et al. (2005) reported that of the 34 patients who fell in their study, 19 (55.9%) were women. Hitcho et al. (2004) found that gender was the only significant difference between patients who fell once and patients who repeatedly fell. In addition, of the 183 patients who fell, 14 experienced moderate-severe injury. Of those who experienced moderate-severe injury, 50% were men and 50% were women. Moderate injury was defined by Hitcho et al. (2004) as moderate head trauma, temporary loss of consciousness, excessive bleeding, and lacerations requiring

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<td>Morgan et al., 1985</td>
<td>To identify high-risk patients or situations for systematic intervention</td>
<td>Descriptive, retrospective 1-year period N = 229 patients and 250 falls Information was obtained from patient incident reports</td>
<td>Patients were categorized by ICD (9th revision) clinical modification diagnostic category. Patients with a neoplasm experienced 45 falls and had the highest median number of patient days (8.37).</td>
<td>Strengths: large sample size Weaknesses: Study did not describe details about patients with cancer who fell or injuries sustained.</td>
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<td>O’Connell et al., 2005</td>
<td>To explore and identify factors associated with patient falls and to provide empirical evidence to guide fall-prevention interventions in oncology and palliative care settings</td>
<td>Quantitative, qualitative, prospective 9-month period N = 227 patients admitted to oncology and palliative care units 34 patients experienced falls.</td>
<td>Many factors were significantly associated with fall status: age; self-rated fatigue level; orientation to person, place, and time; difference in muscle pushing strength between right arm and left arm; confusion (TCS); and physical functioning (ECOG). Patients and nurses attributed falls to poor condition of patients, ambulating factors, toileting issues, patients’ lack of knowledge about equipment, nurse unavailability, or patients not seeking assistance.</td>
<td>Strengths: Many variables were measured; study used quantitative and qualitative methods. Weaknesses: The authors did not differentiate the results between patients with cancer and those receiving palliative care who may not have had cancer.</td>
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<td>Rhode et al., 1990</td>
<td>To identify groups at risk for falls and fall injuries in an acute-care hospital population</td>
<td>Quantitative, retrospective 1-year period N = 874 falls</td>
<td>62 falls (7%) occurred in the oncology service.</td>
<td>Strengths: large sample size Weaknesses: Sample was not oncology specific and did not provide details about falls in patients with cancer.</td>
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<td>Stevenson et al., 1998</td>
<td>To extend knowledge beyond known risk factors of age and medical diagnoses by comparing characteristics of adults who fell while hospitalized with a matched sample of adults who did not fall while hospitalized.</td>
<td>Quantitative, retrospective, descriptive, comparative 10-month period N = 301 falls</td>
<td>8% of patients who fell had a cancer diagnosis.</td>
<td>Strengths: large sample size Weaknesses: Sample was not oncology specific and did not provide details about falls in patients with cancer.</td>
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ECOG—Eastern Cooperative Oncology Group; ICD—International Classification of Diseases; TCS—total confusion score
sutures, whereas severe injury was defined as death, cardiac arrest, fractures, subdural hematomas, or other major head trauma. Stevens and Sogolow (2005) found that rates for injury diagnoses generally were higher among women, reporting that women sustained fall related injury 40%–60% higher than men of comparable age. In addition, Stevens and Sogolow (2005) reported that the greatest gender difference was in women’s fracture rate, which was 2.2 times higher than the rate for men. Hendrich, Bender, and Nyhuis (2003) conducted a case-control study and found that male gender was a significant risk factor for falling and that men were 1.69 times more likely to experience a fall than women. Other research studies have found opposite results. Dharmarajan, Avula, and Norkus (2006) reported from their study of falls (including hospitalized, ambulatory, and nononcology-specific patients) that gender did not have any effect on fall risk when included. Gender also was found to be insignificant in a retrospective study completed in the acute care setting by Stevenson et al. (1998). Not enough data are available to conclude whether or not gender is associated with falls in patients with cancer.

Functional Status and Fatigue State

Functional decline in patients with cancer is common and may include various related factors contributing to risk for falls, including fatigue, deconditioning, depression, chemotherapy or radiation treatment effects, and anorexia or cachexia. The following focuses primarily on fatigue and chemotherapy research. Chen et al. (2005) noted that patients with cancer aged 70 years and older experienced deterioration in functional (and emotional) measurements after receiving chemotherapy. In a retrospective study by Flood et al. (2006) of patients with cancer aged 65 years or older admitted to an oncology acute care older adult unit, 45% were dependent in at least one basic activity of daily living (ADL) or an instrumental ADL (74%) at admission.

Fatigue can be described as a distressing symptom experienced during cancer treatment that interferes with normal functioning (Mock & Olsen, 2003; National Comprehensive Cancer Network, 2010). People with cancer may receive various forms of treatment, such as radiation therapy, cytotoxic drugs, or biologic response modifiers, which all have fatigue as their most common side effect (Nail & Winningham, 1995). Curt et al. (2000) conducted a telephone interview with patients with cancer that had a prior history of chemotherapy and found that 30% (379 participants) reported fatigue on a daily basis and 91% reported that fatigue prevented them from leading their normal lives. Similarly, Wu, Dodd, and Cho (2008) found that fatigue was rated as more severe (particularly in the first three days after treatment) and more prolonged for patients with breast cancer receiving chemotherapy, specifically doxorubicin and cyclophosphamide (AC), third cycle, when compared to women receiving non-AC regimens. A longitudinal study showed that 24% of disease-free patients with breast cancer experienced persistent, severe fatigue within a two-year period (Servaes, Gielissen, Verhagen, & Bleijenberg, 2007). Not enough data are available to conclude that functional status and fatigue states contribute to falls in hospitalized patients with cancer.

Radiation Treatment

Various side effects from radiation treatment may contribute to fall risk. As mentioned, fatigue can negatively affect functioning, which may increase fall risk. In a qualitative study by Ekfors and Petersson (2004), 93% of patients who were receiving radiation therapy for lung cancer reported experiencing general fatigue during treatment. Hervouet et al. (2005) reported that patients with prostate cancer who initially received external radiotherapy had higher levels of depression, anxiety, and fatigue, and lower quality of life. Rose-Ped et al. (2002) noted that lethargy and weakness were debilitating side effects of radiation treatment in patients with head and neck cancer. The author could not find articles linking falls and radiation treatment directly; however, the side effects of radiation may impact fall risk, particularly in combination with the other risk factors listed.

Surgery

Patients with cancer who have surgery may experience side effects that can increase their fall risk. Hodgson and Given (2004) looked at the determinants of functional recovery in older adults surgically treated for cancer and found that fatigue and pain were the most common and most severe symptoms reported. Handy et al. (2002) investigated pre- and postoperative functional health status in patients with lung cancer six months after lung cancer resection. They found that patients who reported poor preoperative functional status had further significant decline (including physical, social, and mental decline) at six months after surgery. In addition, impairment of functional health further declined at six months after lung surgery. Given, Given, Azzouz, and Stommel (2001) found that surgical procedures alone or in combination with the beginning of chemotherapy or radiation proved to be a significant predictor of more compromised physical functioning.

Chemotherapy and Biotherapy

Chemotherapy can have neurotoxic effects (e.g., unsteady gait, confusion, peripheral neuropathy, sensory loss, loss of deep tendon reflexes, postural hypotension) that may predispose a person to gait and balance issues (Holley, 2002). Specific chemotherapy agents such as vinca alkaloids, platinum-based drugs, and taxanes can cause chemotherapy-induced peripheral neuropathy (CIPN) (Paice, 2009; Visovsky, Collins, Abbott, Aschenbrenner, & Hart, 2007). Oxaliplatin (Carreca, Baldacci, & Extermann, 2005; Paice, 2009) and cisplatin (Carreca et al., 2005; Holley, 2002; Paice, 2009) have been implicated in causing CIPN. Specific characteristics of CIPN noted by Visovsky et al. (2007) included sensory and motor symptoms (e.g., paraesthesias, numbness and tingling, weakness, gait, balance disturbances).

Advances in science have made biotherapy a treatment option for patients with cancer. Side effects from biotherapies such as fatigue have been reported frequently in the literature (Finley, 2000; Gould, Tsevat, & Lacasse, 1992; Long, 1996; Nail & Winningham, 1995; Piper et al., 1989; Porock & Juenger, 2004). Specific biotherapeutic agents that cause peripheral neuropathy include bortezomib (Colson, Doss, Swift, Tamrakar, & Thomas, 2004; Paice, 2009; Visovsky et al., 2007), thalidomide (Paice
Peripheral neuropathy can cause numbness and tingling to the hands and feet, which may add to fall risk.

**Endocrine Therapy**

Endocrine (hormone) therapy is a treatment option for patients with breast and prostate cancers. Bone loss has been reported in men who received androgen-deprivation therapy for advanced prostate cancer and in women who received aromatase inhibitors for breast cancer (Saad et al., 2008). Increased risk of fractures has been associated with both treatments (Carreca et al., 2005).

Bylow, Mohile, Stadler, and Dale (2007) reported the specific toxicities of androgen-deprivation therapy, such as muscle wasting, fatigue, and osteoporosis. In a study of falls and physical performance by Bylow et al. (2008), patients with prostate cancer undergoing long-term (at least three months) androgen-deprivation therapy demonstrated high degrees of physical impairment. At baseline assessment, 50% of the patients were found to be anemic (hemoglobin lower than 13 g/dl). Of significance, nine patients had a previous history of falls; of them, 56% experienced additional falls at the three-month follow-up assessment. In addition, of the 31 patients who did not have a history of falls, 12% experienced a new fall during the three-month period. Worsening physical disability was reported in 15% of patients at the three-month follow-up period.

**Cognitive State**

Impaired cognition in hospitalized patients with cancer can be caused by a variety of disease- or treatment-related factors. O’Connell et al. (2005) found that patients with cancer and patients in palliative care who fell were less alert, less attentive, and more confused than patients who did not fall. Patients who fell were four times more likely to incorrectly answer questions of orientation (person, time, and place). At admission (prefall), 28% of patients who fell did not respond correctly when asked for the current year compared to 3% of patients who did not fall; 28% of patients who fell also did not respond correctly when asked for the current month compared to 6% of patients who did not fall.

In a study of patients with cancer hospitalized for palliative care, Pautex et al. (2008) found that delirium was common and significant in predicting a fall during hospitalization. Similarly, Lakatos et al. (2009) reported that 96% of patients who fell had symptoms of delirium. Krauss et al. (2005) reported that confusion was one of six predictors significantly associated with an increased fall risk. However, Fischer et al. (2005) found that although 20% of hospitalized patients who fell were confused, confusion was not a significant predictor of falls resulting in injury. Information on mental status was missing in a substantial number of cases, which may have limited the power to detect a significant association (Fischer et al., 2005).

**Depression**

Depression is a common physiologic response in people with cancer (Brown et al., 2009). According to the American Cancer Society (2009), clinical depression occurs in one of every four individuals with cancer. In Hendrich et al.’s (1995) model of fall risk, clinical depression was the second most significant risk factor following a recent history of falls. Anstey, Burns, von Sanden, and Luszcz (2008) found that depressive symptoms were a risk factor for subsequent falling, and an increasing fall rate was associated with an increase in depressive symptoms. Barsevick, Dudley, and Beck (2006) found that higher levels of depressive symptoms were noted in people with higher fatigue (in the context of poorer functioning). Similarly, Curt et al. (2000) observed that patients with cancer who had recently received chemotherapy and experienced fatigue on a daily basis were significantly more likely to report depression. In addition, Darowski, Chambers, and Chambers (2009) found that antidepressants can contribute to falls and cause untoward effects such as impaired balance, orthostatic hypotension, sedation, and impaired reaction times. Although the literature shows that depression in patients with cancer significantly affects quality of life and safety, more information is needed to understand the role of depression and its treatment in patients with cancer who fall.

**Polypharmacy**

Certain medication groups such as benzodiazepenes (Hendrich et al., 2003; Landi et al., 2005) and antiepileptics (Hendrich et al., 2003) can contribute to fall risk. Psychotropic drugs cause a variety of side effects that could potentiate a fall (Ganz, Bao, Shekelle, & Rubenstein, 2007; Hartikainen, Lonroos, & Louhivuori, 2007; Howland, 2009; Landi et al., 2005). Steroids also may play a role in muscle weakness in patients with cancer (Faiman et al., 2008; MacDonald, Hagen, & Brueru, 1994).

Opioids are a group of drugs that are frequently given to hospitalized patients with cancer to treat pain. Whether or not they contribute to fall risk in this population is controversial. A variety of analgesics and opioids are used, as the mainstay for cancer pain management is pharmacology (Carreca et al., 2005). Although opioids are commonly used in patients with cancer and they are known to cause sedation and dizziness, the link between opioid use and fall risk remains unclear in the general population (Caufield, 2007). According to Walker, Alrawi, Mitchell, Regal, and Khanderia (2005), giving opioid analgesics to hospitalized patients was not associated with falls.

Of the 11 hospital studies reported in Table 1, only one examined the association between polypharmacy and fall risk. In an exploratory study by Pautex et al. (2008), patients who fell were receiving more neuroleptics and corticosteroids, as well as higher doses of opioids. Various medication groups can cause side effects that increase fall risk; however, the role of medications and falls in patients with cancer has not been determined.

**Anemia**

Anemia is a complication of cancer treatment that can cause fatigue, dizziness, drowsiness, and weakness (World Health Organization, 2010), which may contribute to fall risk. However, Pautex et al. (2008) found that anemia was not associated with an increased risk for falls in their study of hospitalized patients with cancer. Other studies have shown the opposite in the general population. Dharmarajan et al. (2006) found that hospitalized patients (not oncology specific) who had fallen had significantly lower hemoglobin levels, higher prevalence of anemia, and longer length of hospital stay. Dharmarajan et al. (2006) also reported that anemia occurred significantly
more often in patients who had fallen compared to control, and patients with anemia had a significantly higher risk of falls than patients without anemia. Duh et al. (2008) confirmed in a community dwelling population of older adults (not oncology specific) that anemia for men (hemoglobin lower than 13 g/dl) and women (lower than 12 g/dl) as defined by the World Health Organization was significantly and independently associated with increased risk of injurious falls. In a prospective cohort study of a nononcology-specific community population by Penninx et al. (2005), 26% of people with anemia had five or more falls during the three-year follow-up of the study compared to 8% of people without anemia. Penninx et al. (2005) also reported that recurrent falls (two falls in six months) occurred in 38% of patients with anemia versus 19% of patients without anemia. In addition, patients with anemia had muscle weakness, poor physical performance, and disability.

Nutritional Status

Many factors exist that influence nutritional status in patients with cancer (Phillips, 2005), and healthcare providers should be aware of them because they can ultimately lead to decreases in functional ability. Cachexia is a common, progressive metabolic condition that results in weight loss and body wasting (Esper & Harb, 2005). A main feature of cachexia is anorexia (Esper & Harb, 2005; Finley, 2000). Anorexia has been noted in the literature and can precipitate malnutrition and derangements in protein, carbohydrate, and fat metabolism, which can cause skeletal-muscle wasting, debilitation, and changes in functional status (Adams et al., 2009). Biotherapy can decrease appetite, and psychological factors such as depression, anxiety, anger, and fear may affect oral intake in patients with cancer (Finley, 2000). Two studies showed that compromised nutritional status is associated with fall risk, but neither specified whether patients with cancer were included. Bauer, Isenring, Torma, Horsley, and Martineau (2007) found that 45% of hospitalized patients who had fallen were malnourished. Vivanti, McDonald, Palmer, and Sinnott (2009) observed a connection between malnutrition and type of fall in older adults who presented to the emergency room after experiencing a fall. Of the 126 patient who were included in the study, 28% reported to the emergency department as a result of the fall. The authors found an increased risk of patients self-reporting a fall during the previous six months in those who were malnourished compared to those who were not.

Implications for Practice

Nurses who work with hospitalized patients with cancer would benefit from knowledge of their patients’ fall risk factors such as age, gender, treatment, cognitive changes, anemia, and malnutrition. However, more research is needed to understand how patients with cancer differ from other hospitalized patient populations in fall rates and outcomes. Falls can increase length of hospital stays, costs, and discharge to a long-term care facility; therefore, teaching nurses, patients, and families about fall risk factors is vital to improving patient outcomes. This may prevent significant morbidity and mortality in this vulnerable population.

Conclusion

Based on what is known to date about falls in hospitalized patients with cancer, further research is needed to understand this unique phenomenon, although a multitude of risk factors have been shown to contribute to fall risk in this population. The 11 studies described in this article specifically discussed patients with cancer; however, few provided specific, detailed information about patients with cancer who fell.

Studies may be needed to understand diagnosis-specific groups that may have different risk factors for falls, such as patients with breast, lung, or colon cancer or radiation and chemotherapy recipients. In addition, subgroups such as bone marrow transplantation recipients and patients receiving hospice and palliative care may need specific attention because the care they receive in the hospital setting may differ from that of the general population of patients with cancer. Unique side effects from treatment, such as thrombocytopenia, also should be studied to understand their role in injurious falls. Determining oncology-specific risk factors and interventions can help improve patients’ safety, as well as quality of life.

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